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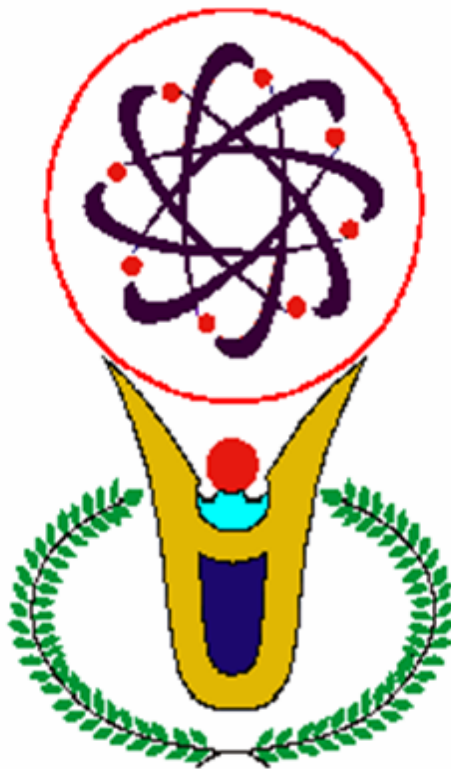
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**4<sup>th</sup> International Mathematics and Science Olympiad  
(IMSO) for Primary School 2007**

**THEORETICAL EXAMINATION II**

**(90 MINUTES)**



Name	Country

**Jakarta, Indonesia  
Tuesday, 13 November 2007**

*Theoretical Examination II, IMSO, Jakarta 13 November 2007*

Name: \_\_\_\_\_; Country: \_\_\_\_\_

### INSTRUCTIONS

1. Check the number of pages in this Theoretical Examination I. There are 20 pages including the cover.
2. The total number of problems is 30.
3. Make sure you write your name and country on every page.
4. There are several type of problems: multiple choices, short answer, and explanation (essay) or a combination of them.

Name: \_\_\_\_\_; Country: \_\_\_\_\_

**No 1. Multiple choice (Score: 1)**

Plants use water for .....

(1) cell growth ; (2) photosynthesis; (3) germination

- A. (1) and (2)
- B. (1) and (3)
- C. (2) and (3)
- D. (1), (2) and (3)
- E. None of them

**No 2. Multiple choice (Score: 1)**

Animals in the house may indicate a potential disease that may be spread in the family. If you have a cat in the house, choose the following disease that may be spread by the cat to human:

- A. Dengue
- B. Avian influenza
- C. AIDS
- D. Polio
- E. Tuberculosis

**No 3. Multiple choice (Score: 1),**

Why does the seed of the coffee have a very tough seed coat? The seed can .....

- A. be dispersed by propulsion
- B. extend the distance of its dispersal by traveling breezes
- C. adhere to passing animals
- D. survive the mechanical forces and conditions of the animal's gut
- E. attract the animals

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**No 4. Multiple choice (Score: 1)**

Which of the following statements about an animal's size and shape is **not true**?

- A. larger animals require more food than smaller animals
- B. larger animals produce more waste than smaller animals
- C. larger animals are more vulnerable to cold than smaller animals
- D. larger animals require more oxygen than smaller animals
- E. larger animals require larger area than smaller animals

**No 5. Essay**

(a) If you are driving 72 km/h and you look outside through the window for 2 seconds, how far do you travel during this 2 seconds period? **(Score: 1)**

(b) If there is a bicyclist 35 m in front of your car and moving at the speed of 18 km/h, will your car hit the bicyclist? Give your reason? **(Score: 1)**

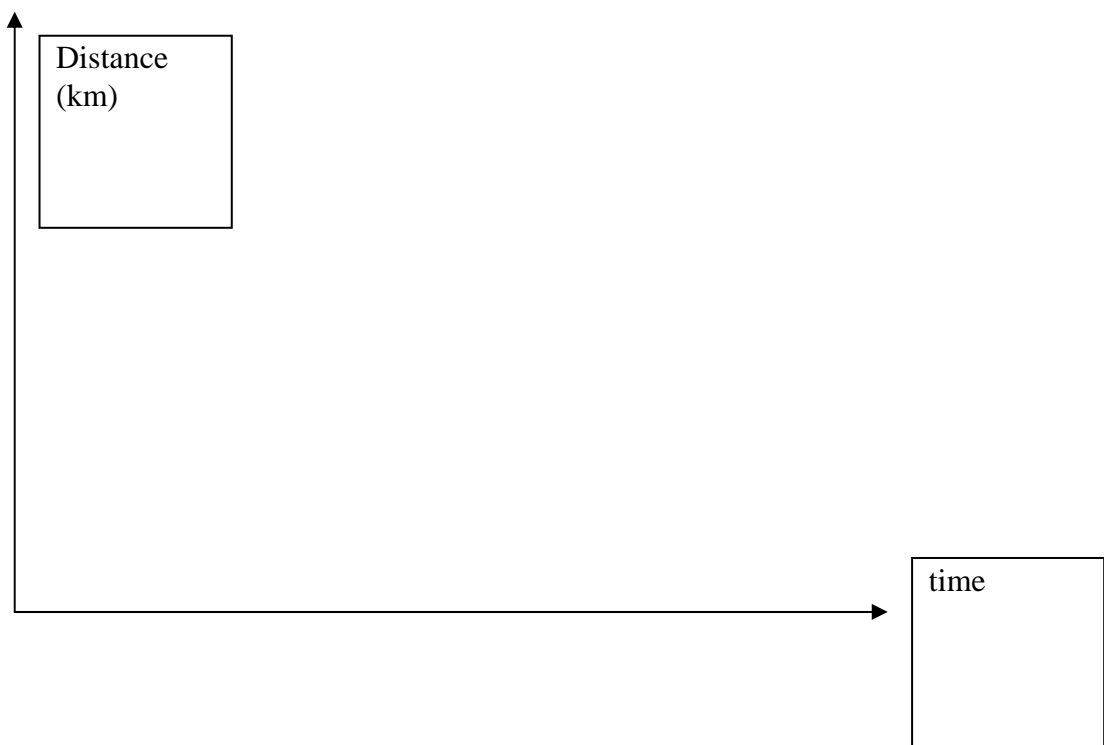
Name: \_\_\_\_\_; Country: \_\_\_\_\_

**No 6. Essay**

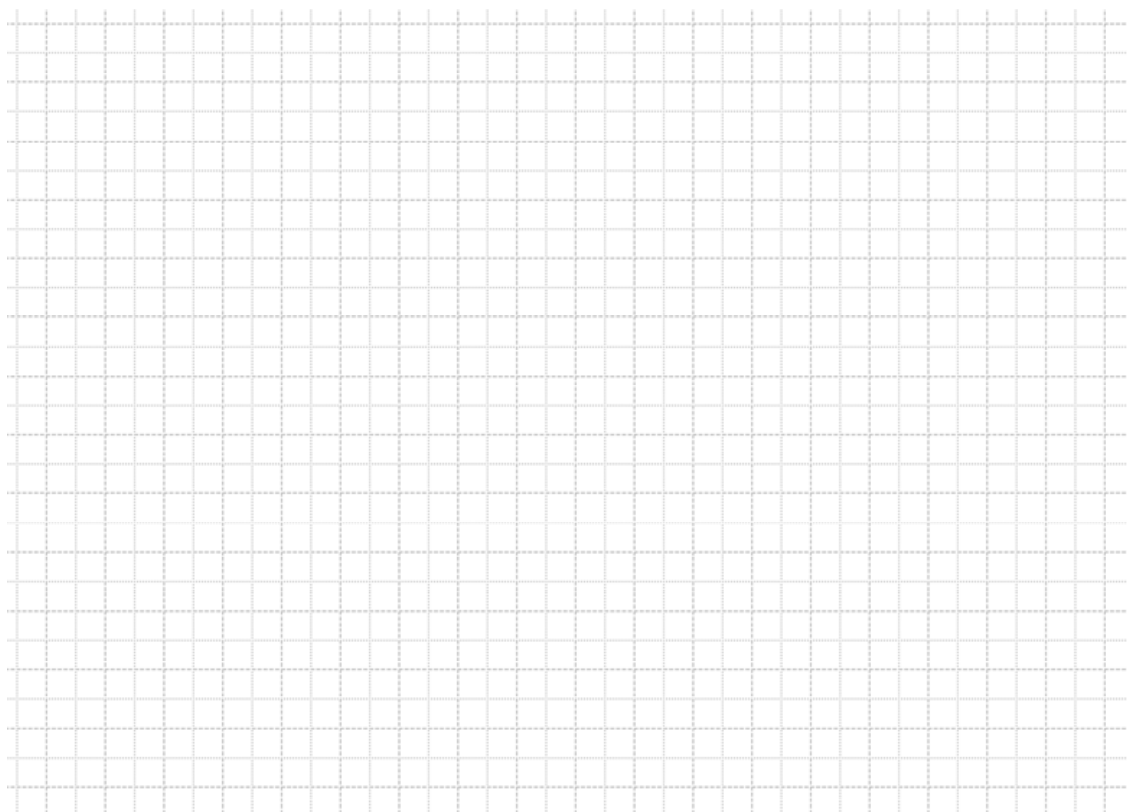
The following data is taken from a moving car over a period of time.

Time clock	12:00	12:30	13:00	13:30	14:00	14:30	15:00	15:30	16:00	16:30	17:00
Distance (km)	0	15	25	35	40	45	50	55	75	85	100

- a) Draw a graph to show the relationship between time and distance. **(score 2)**



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b) Which range of time does the car move at the greatest speed? **(score 1)**

**No 7. Multiple choice (score 1)**

The diagrams A & B illustrate two stages of an experiment performed using a spring balance, compression balance, a vessel of water and a stone.

In stage A

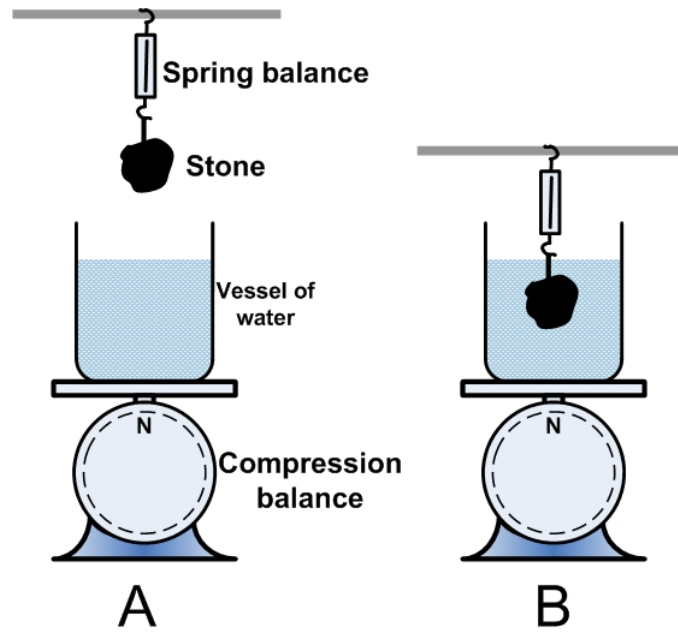
The reading of the spring balance was 0.5 N

The reading of the compression balance was 5.0 N

In stage B

The reading of the spring balance was 0.4 N

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What would be the reading on the compression balance in stage B?

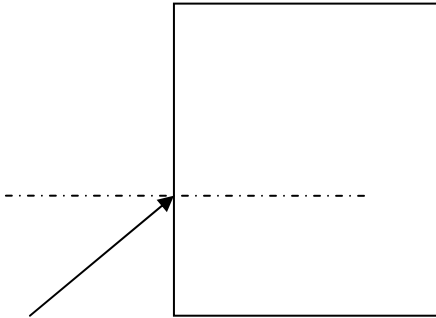
- A. 4.9 N
- B. 5.0 N
- C. 5.1 N
- D. 5.2 N
- E. 5.5 N

(Score: 1)

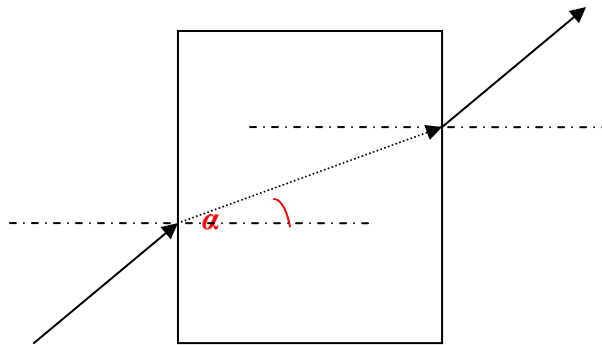
**No 8. Essay (score: 2)**

The figure below shows a ray of light passing from air into a glass block.

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- (a) On the Figure above, draw two straight lines to show what happens to the ray of light as it passes through the block and out into the air. 1,

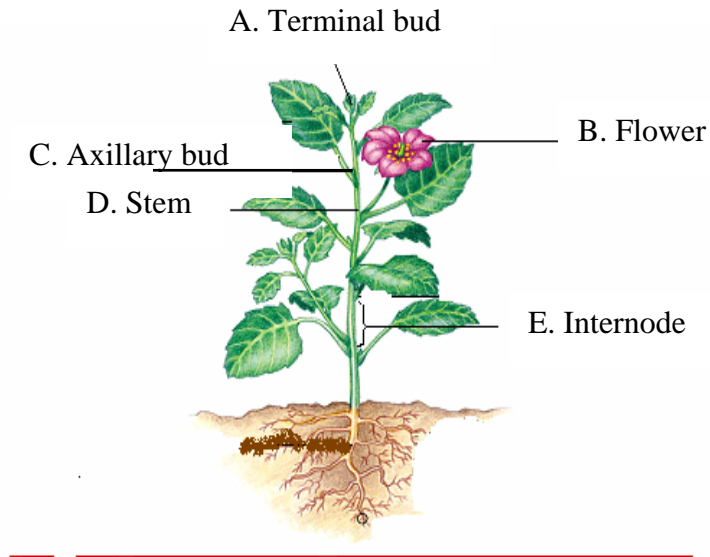


- (b) On the Figure above, indicate the angle of refraction as the ray enters the block.

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**No 9. Multiple choice (score: 1)**

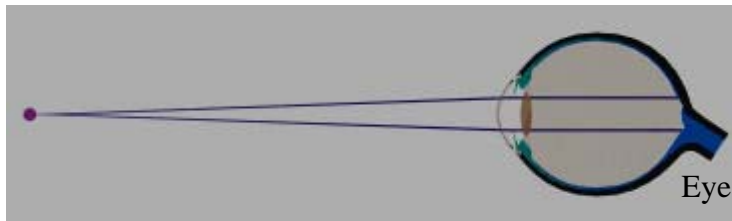
If you want to make your plant increase in height, which part of the plant you have to cut?



**No 10. Multiple choice (score : 1)**

Choose the correct picture showing the path of light entering a normal eye?

A.

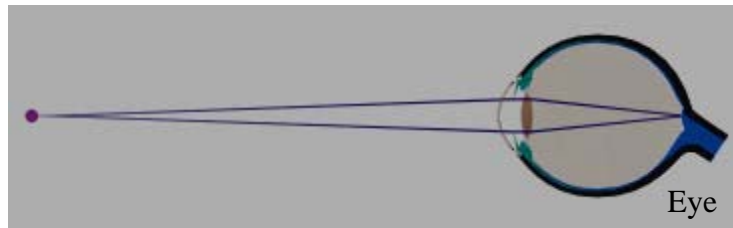


B.



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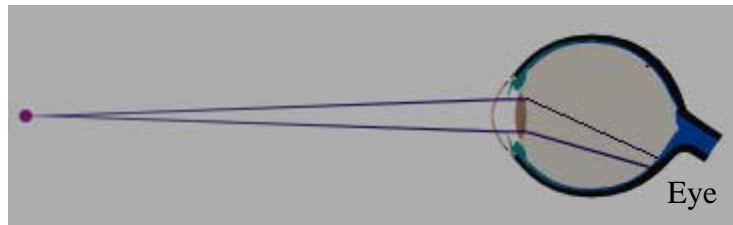
C.



D.



E.



**No 11. Multiple choice (score: 1)**

Which of the following substances can be recycled in an ecosystem?

(1) carbohydrate; (2) water; (3) nitrate

- A. (1) and (2)
- B. (1) and (3)
- C. (2) and (3)
- D. (1), (2) and (3)
- E. None of them

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**No 12. Essay (score: 4)**

In order to increase speed and agility, an animal uses different kinds of strategy. Complete the table by writing the body part used by the animal.

ANIMALS	REDUCE FRICTION	INCREASE FRICTION
Fish		
Bird		Flap and tail
Frog	Mucous skin	

**No 13. Essay (score: 3)**

Water vaporizes at 100°C

Water freezes at 0°C

Using the above facts, describe the procedure of scaling a thermometer?

You are provided

- |                |                      |
|----------------|----------------------|
| a beaker       | a burner             |
| some ice cubes | a retort/iron stand  |
| water          | a ruler              |
| marker         | unscaled thermometer |

(You could answer the question by writing or using labeled diagram).

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Step 1 : .....  
.....  
.....

Step 2 : .....  
.....  
.....

Step 3 : .....  
.....  
.....

**No 14. Multiple choice (score: 2)**

Which of the following type of reproduction produces offspring with identical genotypes?

(1) buds from the same potato tuber ; (2) seeds from the same tomato ; (3) spores from the same fungus.

- A. (1) and (2)
- B. (1) and (3)
- C. (2) and (3)
- D. (1), (2) and (3)
- E. None of them

**No 15. Essay (score: 1.5)**

List three energy forms that result from gasoline burned in a car.

**Answer:**

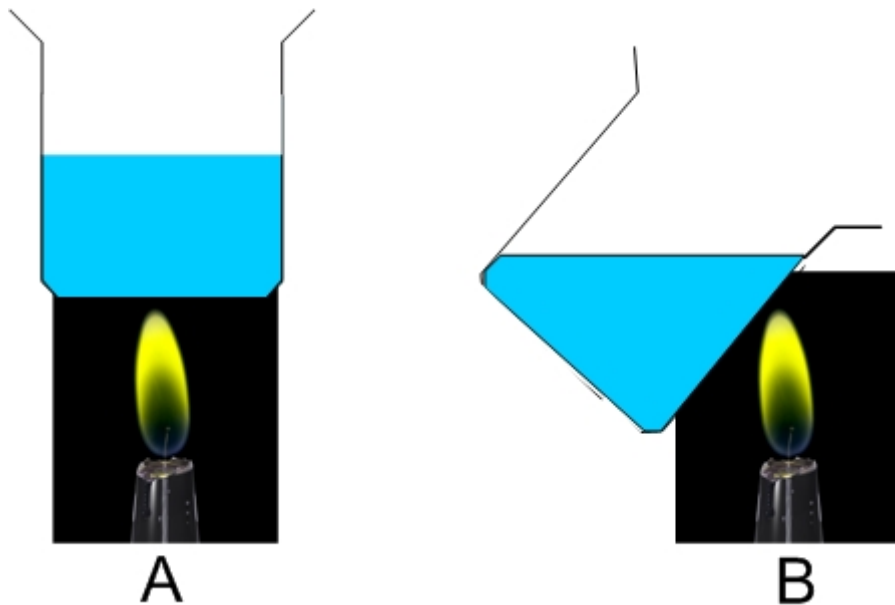
**No 16. Multiple choice (score: 1)**

If an animal is subjected to repeat stimulation, it may gradually cease to respond. This is an example of:

- A. selection
- B. habituation
- C. sign of stimulus
- D. irritability
- E. reflex

**No 17. Essay (score: 3)**

The following picture shows two ways of heating a cup of water using a candle. Which one do you select to heat the water faster? Explain your answer.



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**No 18. Essay (total score: 3)**

Fossil fuel is an important energy resource. It provides energy for transportation, heating and electricity generation.

- (a) The energy stored in fossil fuel came from the Sun.

Describe how energy from the Sun became stored in fossil fuel.

- (b) Fossil fuel can be described as a non-renewable resource. Explain.

.....

**No 19. Essay (score: 2)**

Look at the following picture. Mention the similarity and difference of levitation force on two types of balloon.



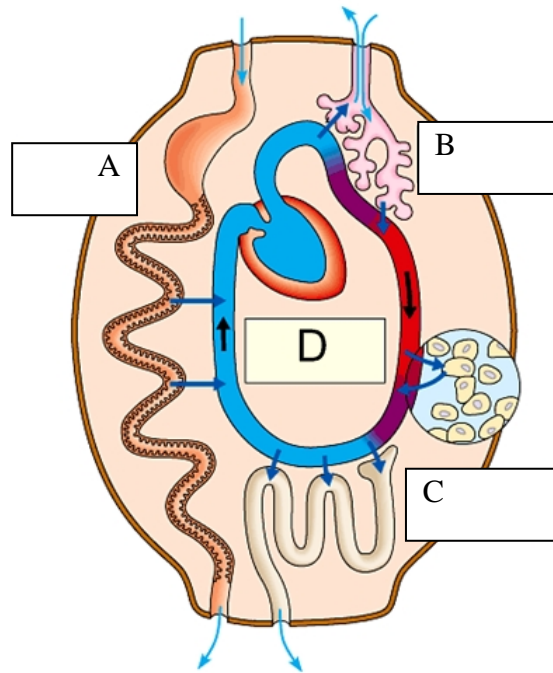
- a) The similarity: .....

- c) The difference: .....

**No 20. Short answers (score: 4)**

The following picture is a diagrammatic figure of various kinds of systems in animal.

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NAME OF THE SYSTEM	POSITION	FUNCTION
Circulatory system	D	
	C	
		Gas O <sub>2</sub> -CO <sub>2</sub> exchange
	A	

**No 21. Matching the answers (score: 2)**

The following is a list of substances which can be found in blood. Match the substances with the correct description on the left box by putting only one letter in the blank box:

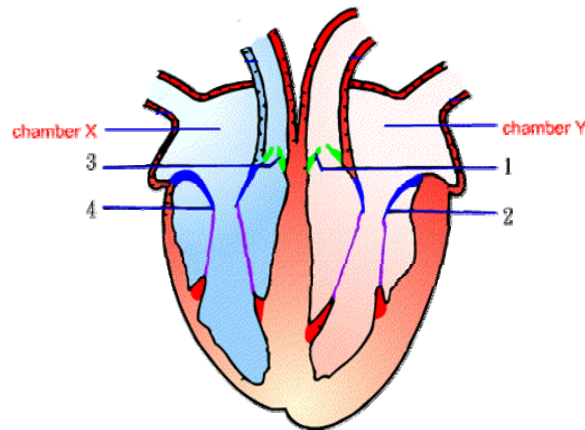
Name: \_\_\_\_\_; Country: \_\_\_\_\_

Antibodies & Antitoxins	
Oxygens and nutrients	
Urea, Carbondioxide	
Hormones	

- A. Materials needed for production of energy
- B. Signal molecules which regulate body processes
- C. Waste products from cells
- D. Molecules needed for body protection
- E. Molecules which responsible to digest other molecule
- F. Substance that carries oxygen and contains iron in the blood

**No 22A. Multiple choice (score 1)**

The following picture should be used to answer the next two questions :



What are the conditions of the heart valves when the ventricles are all relaxed?

- A. Valves 1 and 2 are closed; valves 3 and 4 are open.
- B. Valves 1 and 3 are closed; valves 2 and 4 are open.
- C. Valves 1 and 3 are open; valves 2 and 4 are closed.
- D. Valves 1 and 2 are open; valves 3 and 4 are closed.
- E. All of the valves are open

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**No 22B. Multiple choice (score: 1)**

Some people may have a hole in the septum that separates chambers X and Y. What problem will they have?

- a. They may develop anemia.
- b. They may have a lower blood pressure.
- c. Their blood may not be able to clot normally.
- d. Their arterial blood may not be fully oxygenated
- e. They may have a higher blood pressure

**No 23. Essay (score: 2)**

State two advantages of Earth's magnetic field for the living things?

**No 24. Short answers (score: 2.5)**

Give (✓) sign for sentences that suitable for term **weather** and **climate**

	<b>Weather</b>	<b>Climate</b>
The condition of the atmosphere over a short period of time		
Average weather conditions of a place over a long period of time		
Refers to the day to day temperature, air pressure, winds, clouds, and humidity		
Affected by the ocean current that carry warmth around the world		
Affected by distance from the sea and its height above sea level		

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**No 25. Short answers (score: 3)**

An ecologist studied the number of organisms in grassland area over a three year period:

Year	Grasshoppers	Mice	Insectivorous bird	Grassland area
1	220	15	1	10 Hectares
2	140	16	0	7 Hectares
3	80	14	5	3 Hectares

Pick from the following choices to answer question (a), (b), and (c):

- A. Mice population is increasing
- B. Mice population does not depend on the area of grassland
- C. Insectivorous birds is migrating into the area
- D. The grassland area is decreasing
- E. Insectivorous bird depends on population of grasshopper
- F. The grassland area affects the population of bird

- (a) What is the best explanation for the decrease in the population of grasshoppers from year 1 to year 3? .....
- (b) What is the best explanation for the change in the mice population? ..
- (c) What is the best explanation for the change in the bird population?

Name: \_\_\_\_\_; Country: \_\_\_\_\_

**No 26. Matching the answers (score: 4)**

Fill in the blanks using the words listed below.

vitamin D  
sunburn  
antiseptic  
globe  
atmosphere  
magnetic field  
skin color

- a) Ultraviolet light from the Sun has .....properties and can be used to sterilize tools.
- b) Ultraviolet light has other medical effects such as the production of .....
- c) Ultraviolet light is strongly reduced by Earth's .....
- d) The variation of ultraviolet light with latitude is responsible for many biological adaptations, including variation in human .....

**No 27. Short answer (score: 2)**

Constellation is a group of vicinity stars forming a certain shape like animal, people, and others when seen from the Earth. In fact, the stars forming a constellation are not close as we see. They might separate billions light of year.

- a) Explain why they look closer when observed from the Earth?

.....  
....., optical illusion.....  
.....

- b) Give a simple illustration to prove your answer

.....

Name: \_\_\_\_\_; Country: \_\_\_\_\_

**No 29. Explanation (score: 3)**

a) Arrange the layers of atmosphere below in sequence, start from the layer near the Earth surface to the outer ones: thermosphere, ionosphere, stratosphere, and troposphere.

.....

.....

b) While you are listening to the radio at night, you might pick up a station broadcasting farther than you are listening at daytime. Explain briefly why the phenomena occur.

**No 30. Essay (score: 3)**

The following picture is an example of solar cell panel and how it works. It contains large number of cells to work as converter of light to electric current.

a) Explain the process of conversion of light into electricity.

**Answer:**

.....

.....

.....

.....

b) In which countries (tropical or sub-tropical) the capacity of converting sunlight into electricity is higher? Explain your answer.

Name: \_\_\_\_\_; Country: \_\_\_\_\_

